This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

OIPE JC105 FEB 26 2004 PATENT & TRADEMARK OFFICE

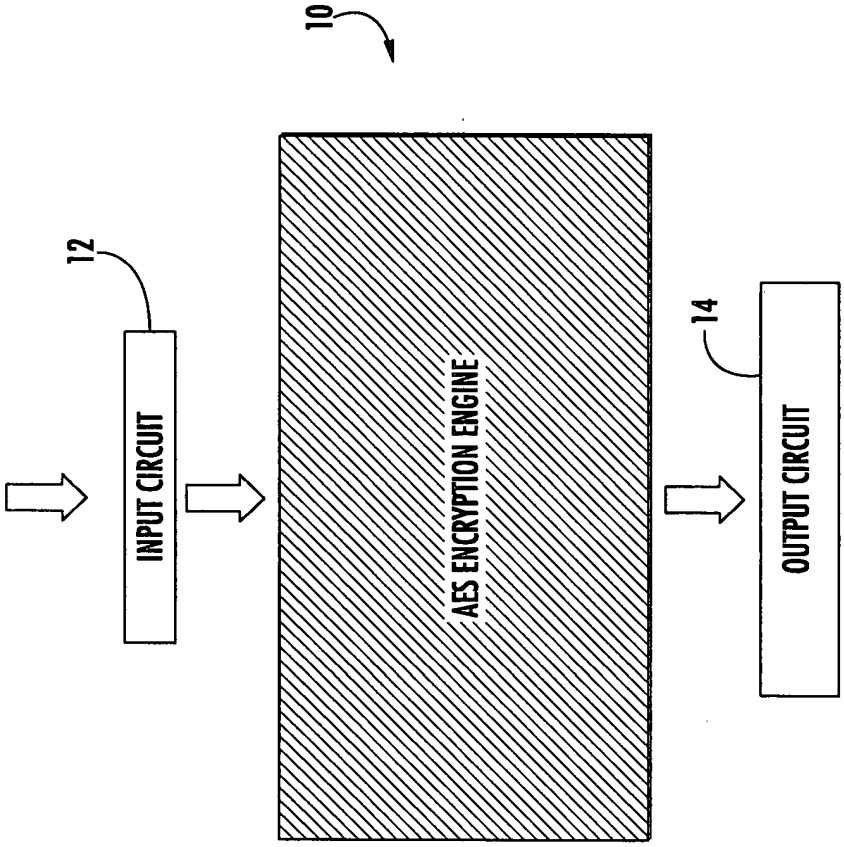


FIG. 1

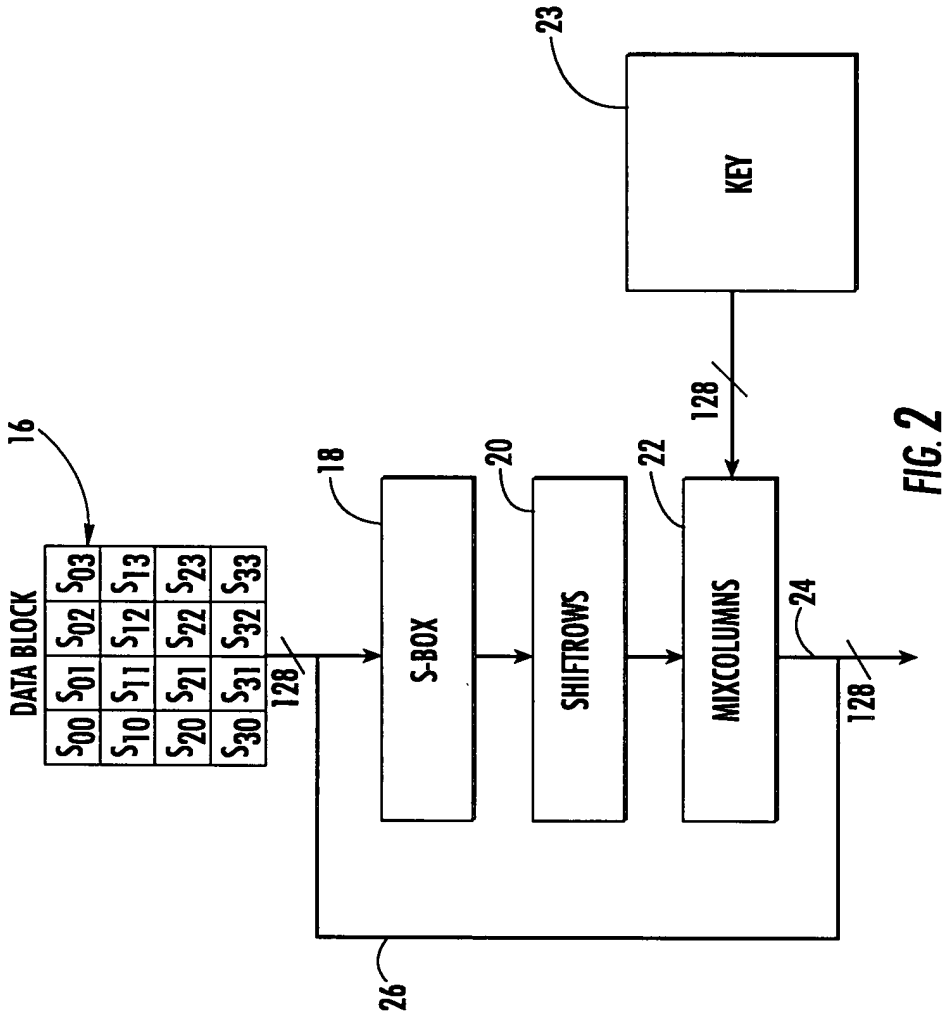

23
KEY
128
16
18
20
22
DATA BLOCK
S00 S01 S02 S03
S10 S11 S12 S13
S20 S21 S22 S23
S30 S31 S32 S33
128
S-BOX
SHIFTROWS
MIXCOLUMNS
24
128
26

FIG. 2

3/15

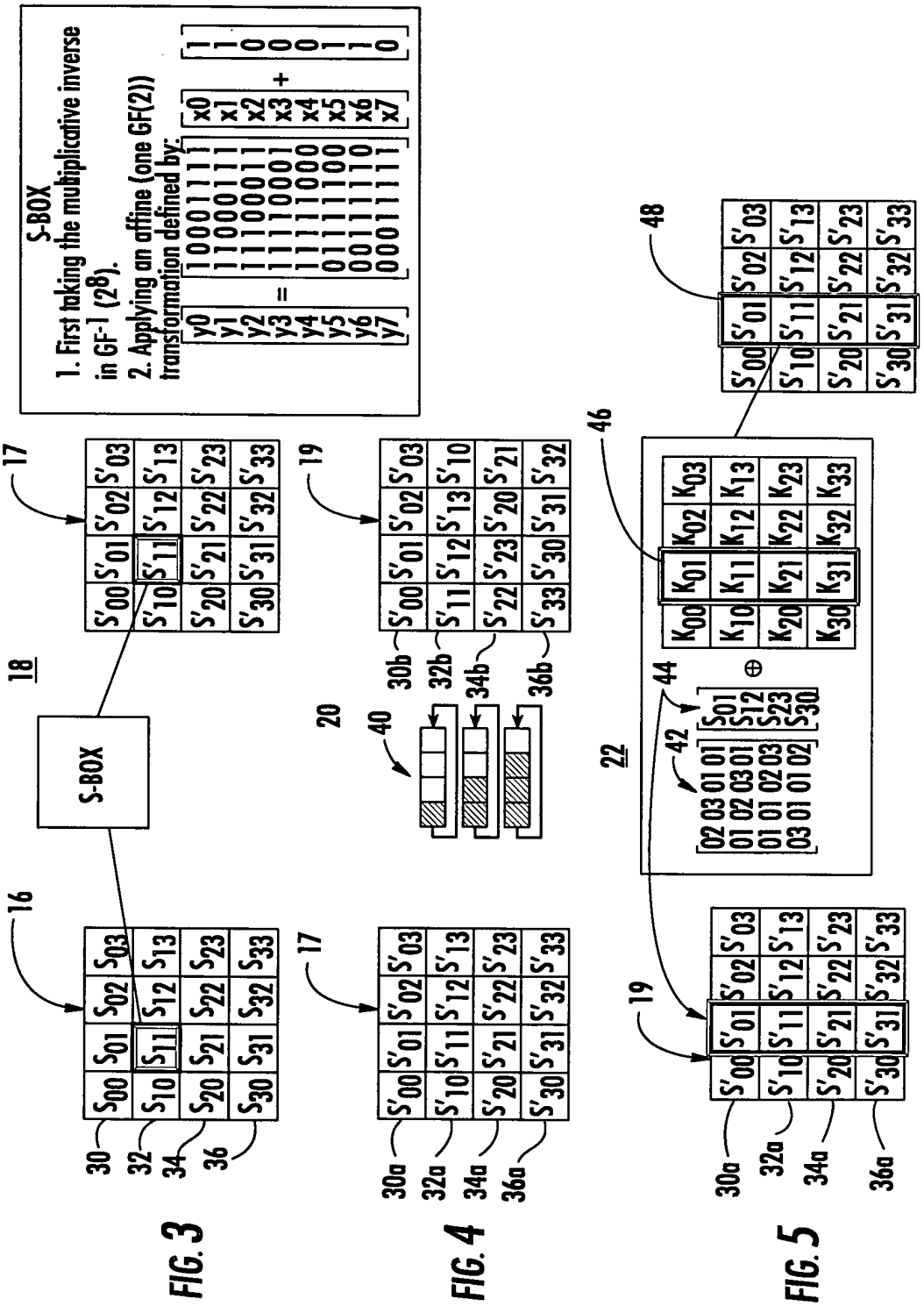


FIG. 3

FIG. 4

FIG. 5

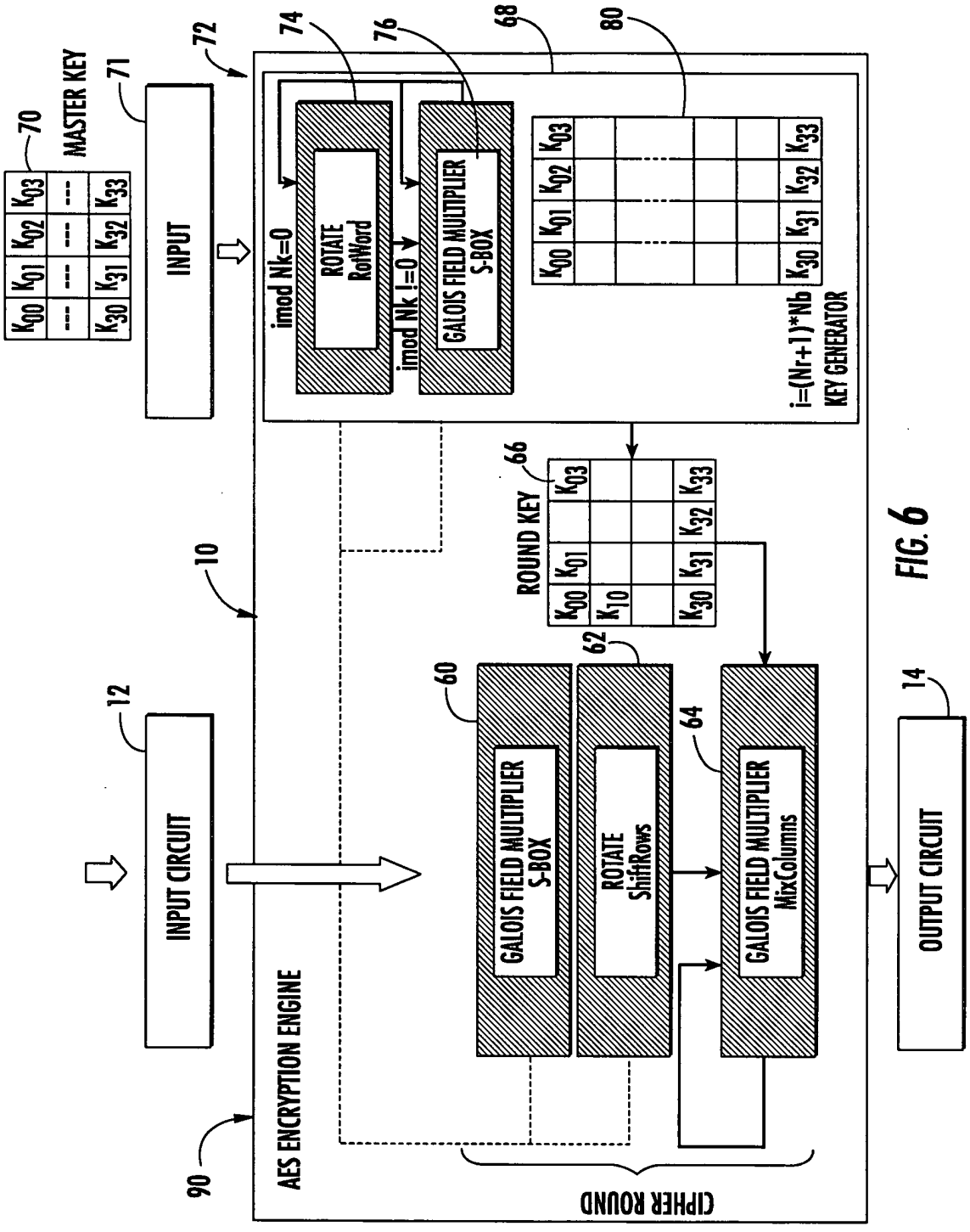

MASTER KEY
70
71
72
74
76
68
80
INPUT
ROTATE
RotWord
imod Nk=0
imod Nk !=0
GALOIS FIELD MULTIPLIER
S-BOX
i=(Nr+1)*Nb
KEY GENERATOR
ROUND KEY
66
10
12
INPUT CIRCUIT
60
62
64
GALOIS FIELD MULTIPLIER
S-BOX
ROTATE
ShiftRows
GALOIS FIELD MULTIPLIER
MixColumns
14
OUTPUT CIRCUIT
90
AES ENCRYPTION ENGINE
CIPHER ROUND

FIG. 6

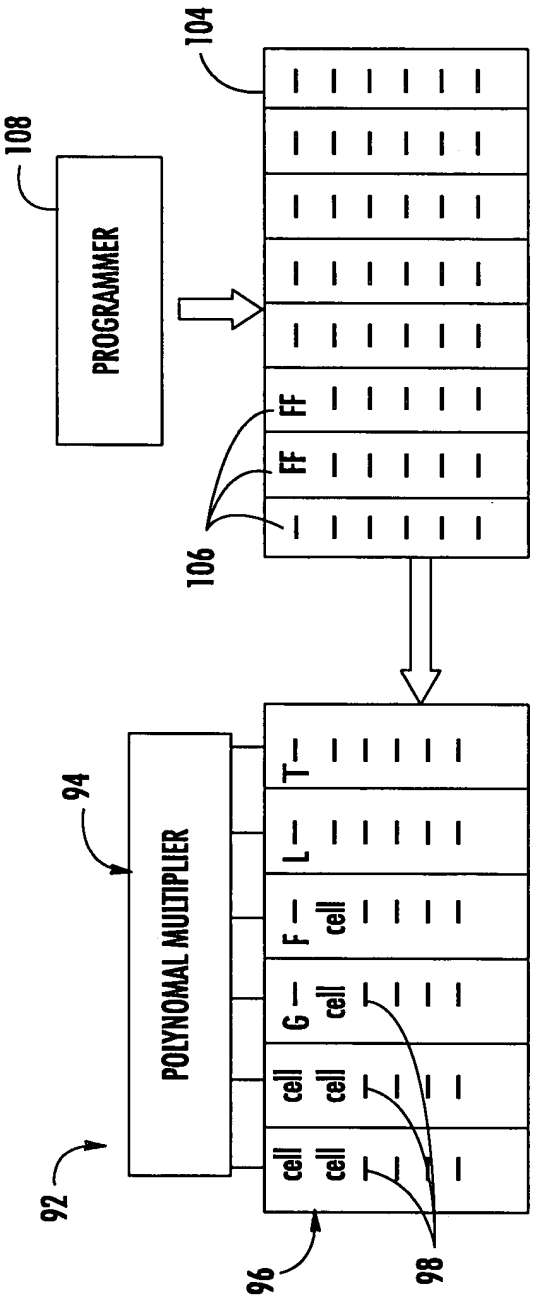

104
108
PROGRAMMER
FF
FF
106
94
POLYNOMAL MULTIPLIER
T
L
F
cell
G
cell
cell
cell
cell
cell
92
96
98

FIG. 7

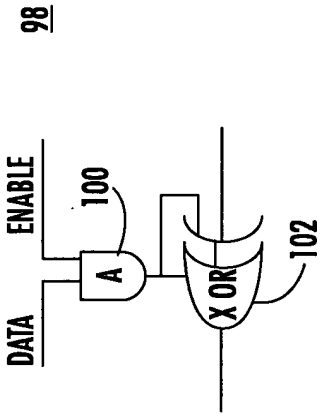

98
ENABLE
100
A
DATA
X OR
102

FIG. 8

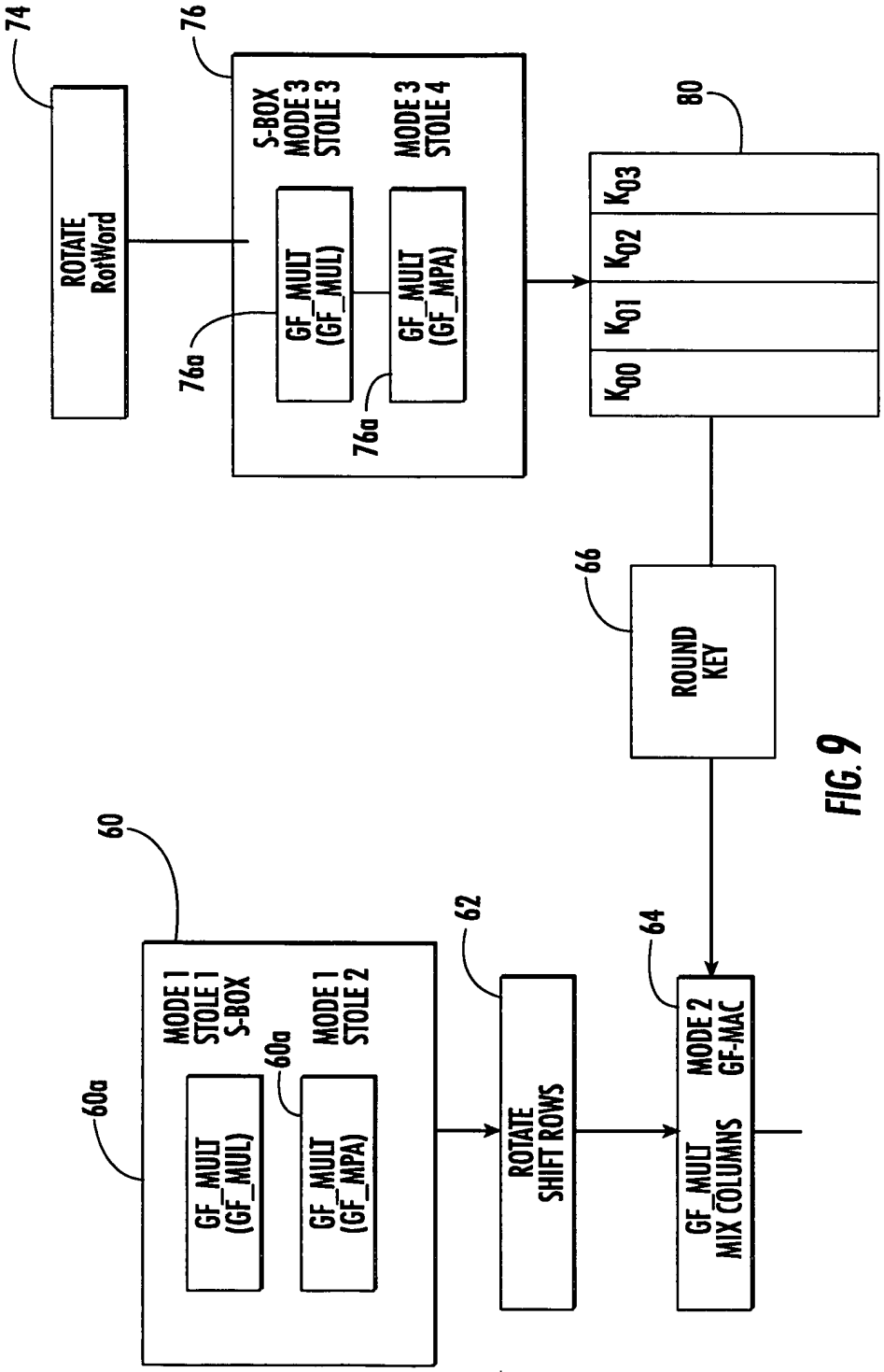

74
ROTATE
RotWord
76
S-BOX
MODE 3
STOLE 3
MODE 3
STOLE 4
GF_MULT
(GF_MUL)
GF_MULT
(GF_MPA)
76a
76a
80
K03
K02
K01
K00
66
ROUND
KEY
60
MODE 1
STOLE 1
S-BOX
MODE 1
STOLE 2
60a
60a
GF_MULT
(GF_MUL)
GF_MULT
(GF_MPA)
62
ROTATE
SHIFT ROWS
64
MODE 2
GF-MAC
GF_MULT
MIX COLUMNS

FIG. 9

7/15

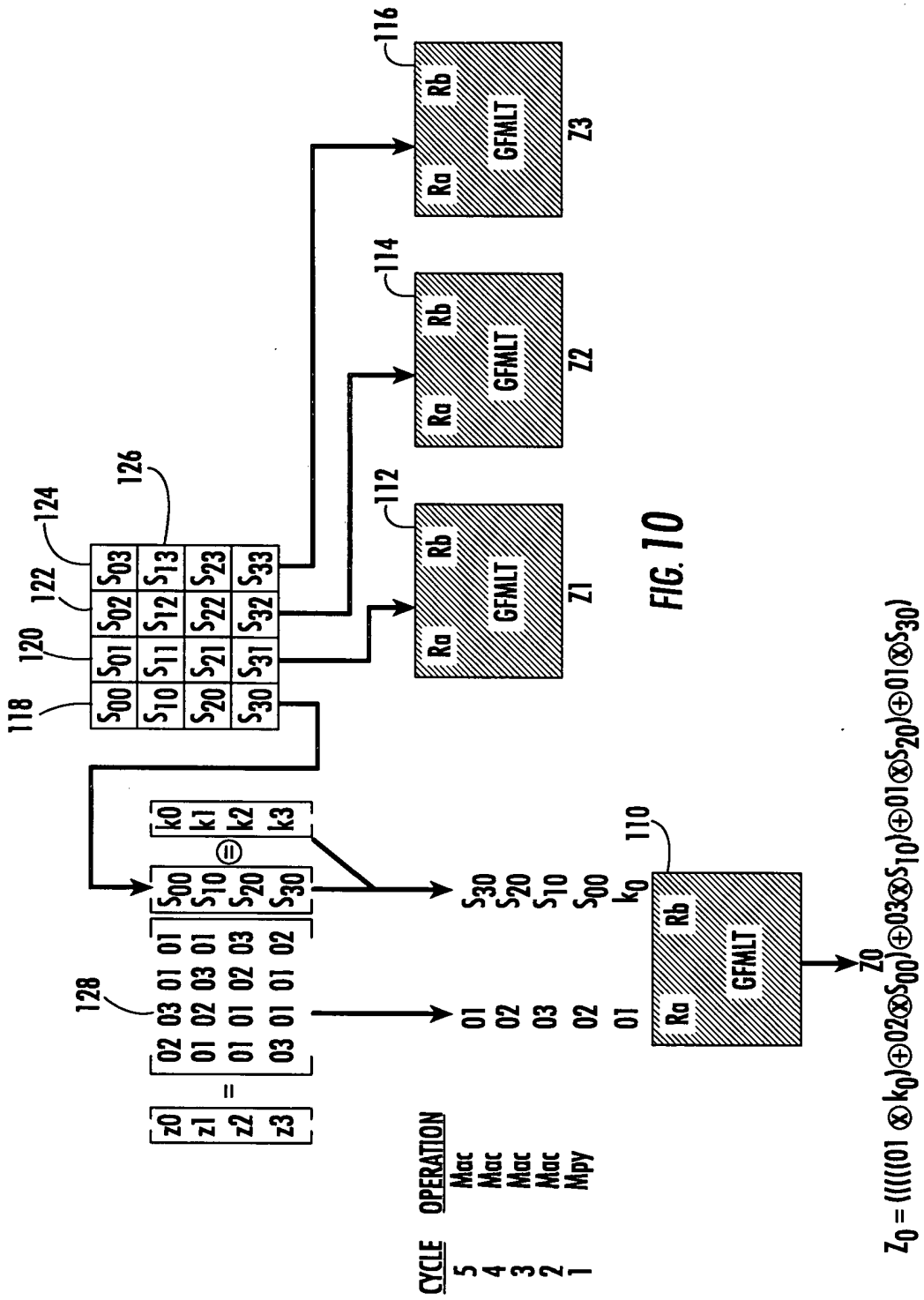

116
114
112
110
126
124
122
120
118
128
Rb
Ra
GFMLT
Z3
Z2
Z1
Z0
k0 k1 k2 k3
S00 S10 S20 S30
S30 S20 S10 S00 k0
01 02 03 02 01
02 03 01 01
01 02 03 01
01 01 02 03
03 01 01 02
z0 z1 z2 z3
CYCLE OPERATION
5 Mac
4 Mac
3 Mac
2 Mac
1 Mpy
Z0 = ((((((01 ⊗ k0)⊕02⊗S00)⊕03⊗S10)⊕01⊗S20)⊕01⊗S30)

FIG. 10

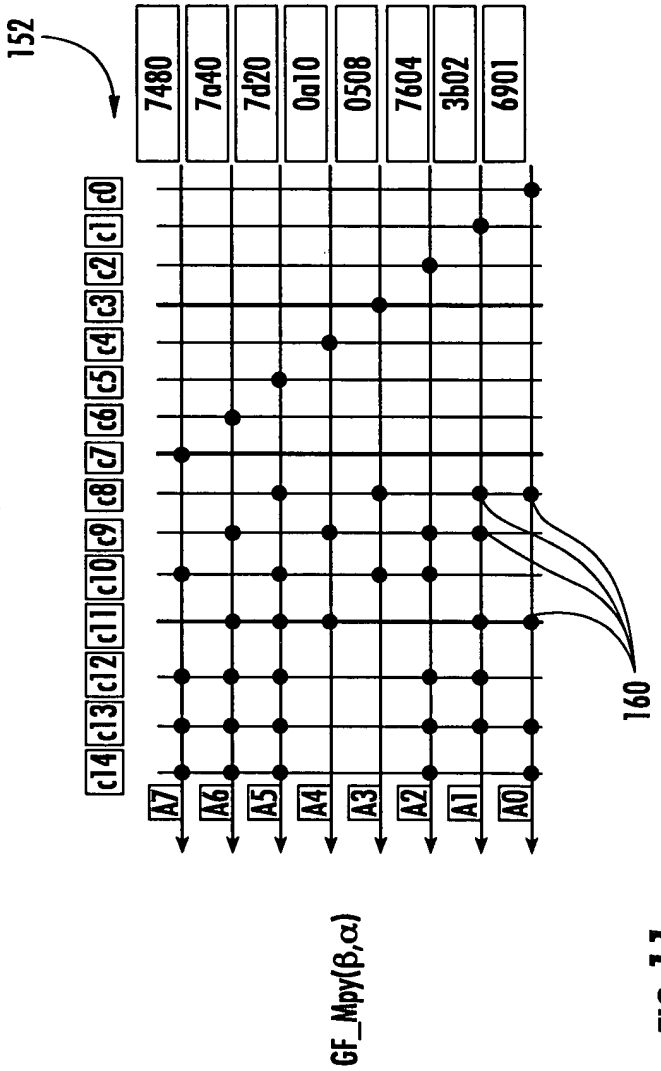
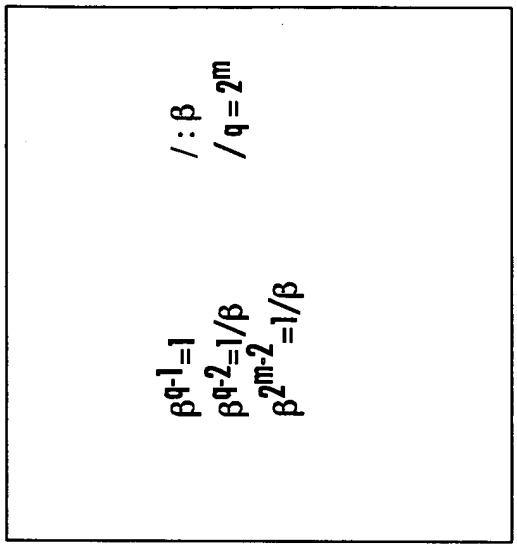

152
7480
7a40
7d20
0a10
0508
7604
3b02
6901
c0
c1
c2
c3
c4
c5
c6
c7
c8
c9
c10
c11
c12
c13
c14
A7
A6
A5
A4
A3
A2
A1
A0
160
GF_Mpy(β,α)

FIG. 11

9/15


/ : β
/ q = 2^m
β^(q-1)=1
β^(q-2)=1/β
β^(2^m-2)=1/β

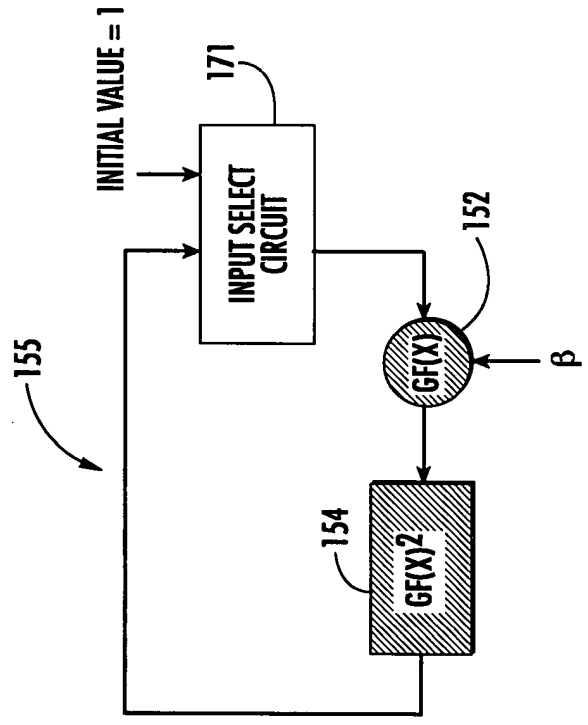

INITIAL VALUE = 1
171
INPUT SELECT CIRCUIT
152
GF(X)
β
155
154
GF(X)^2

FIG. 12

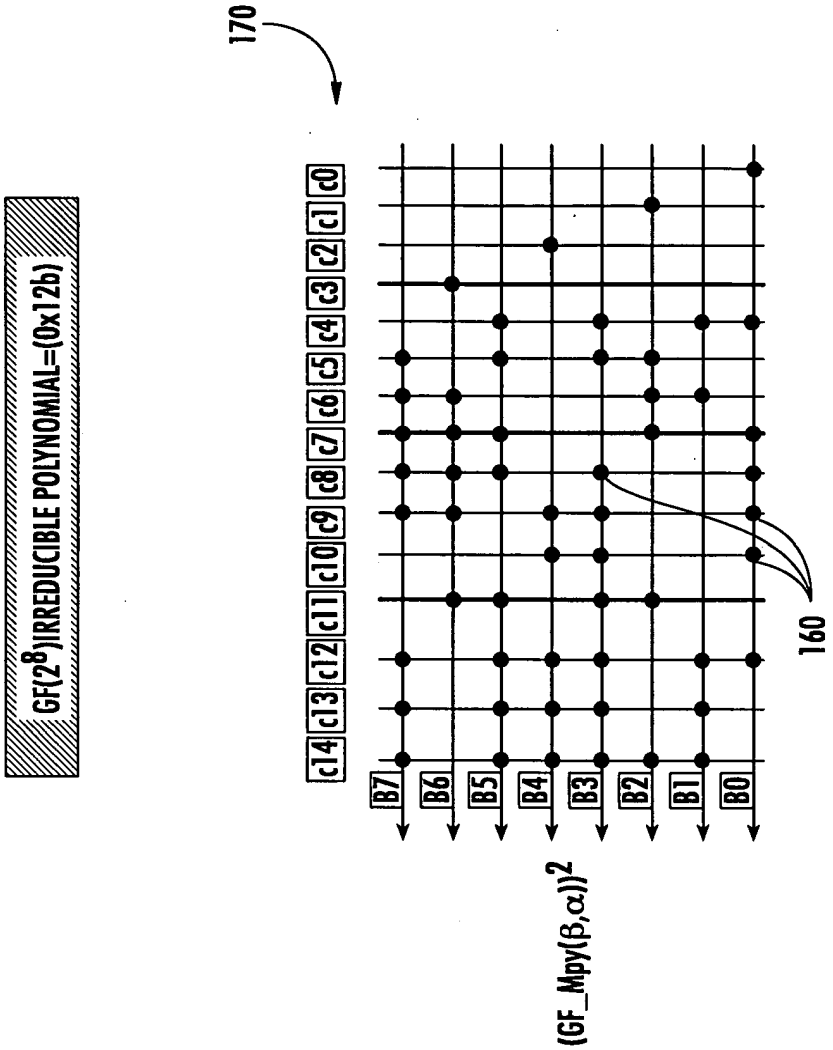

170
GF(2^8)IRREDUCIBLE POLYNOMIAL=(0x12b)
c14 c13 c12 c11 c10 c9 c8 c7 c6 c5 c4 c3 c2 c1 c0
B7 B6 B5 B4 B3 B2 B1 B0
160
(GF_Mpy(β,α))^2

FIG. 13

11/15

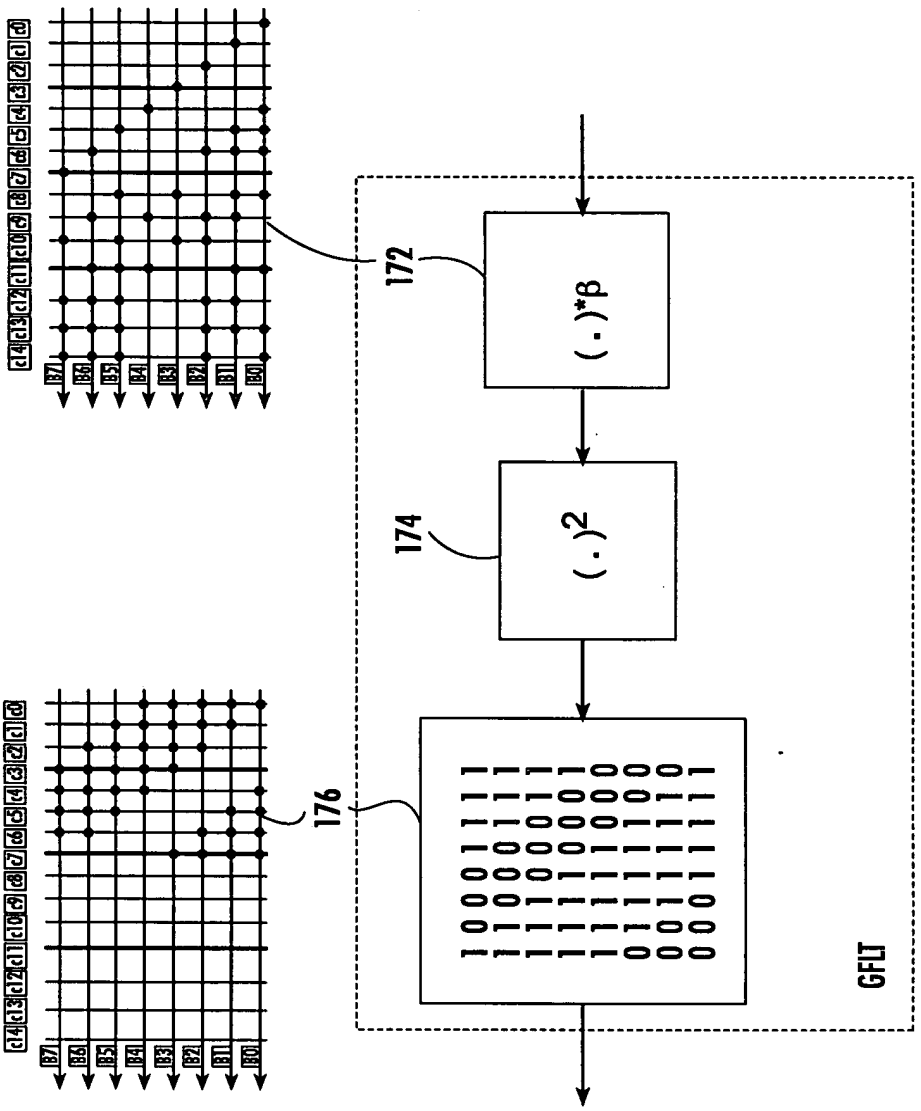


FIG. 14

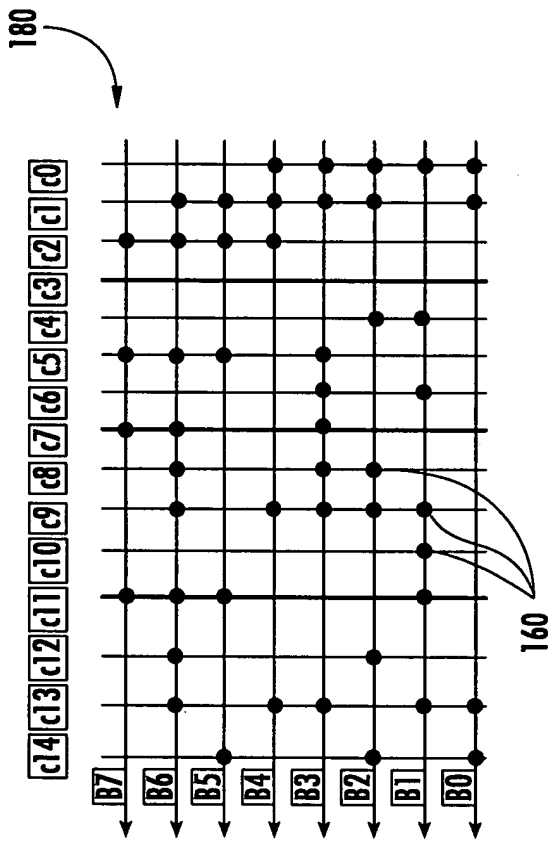

180
c0
c1
c2
c3
c4
c5
c6
c7
c8
c9
c10
c11
c12
c13
c14
B7
B6
B5
B4
B3
B2
B1
B0
160

FIG. 15

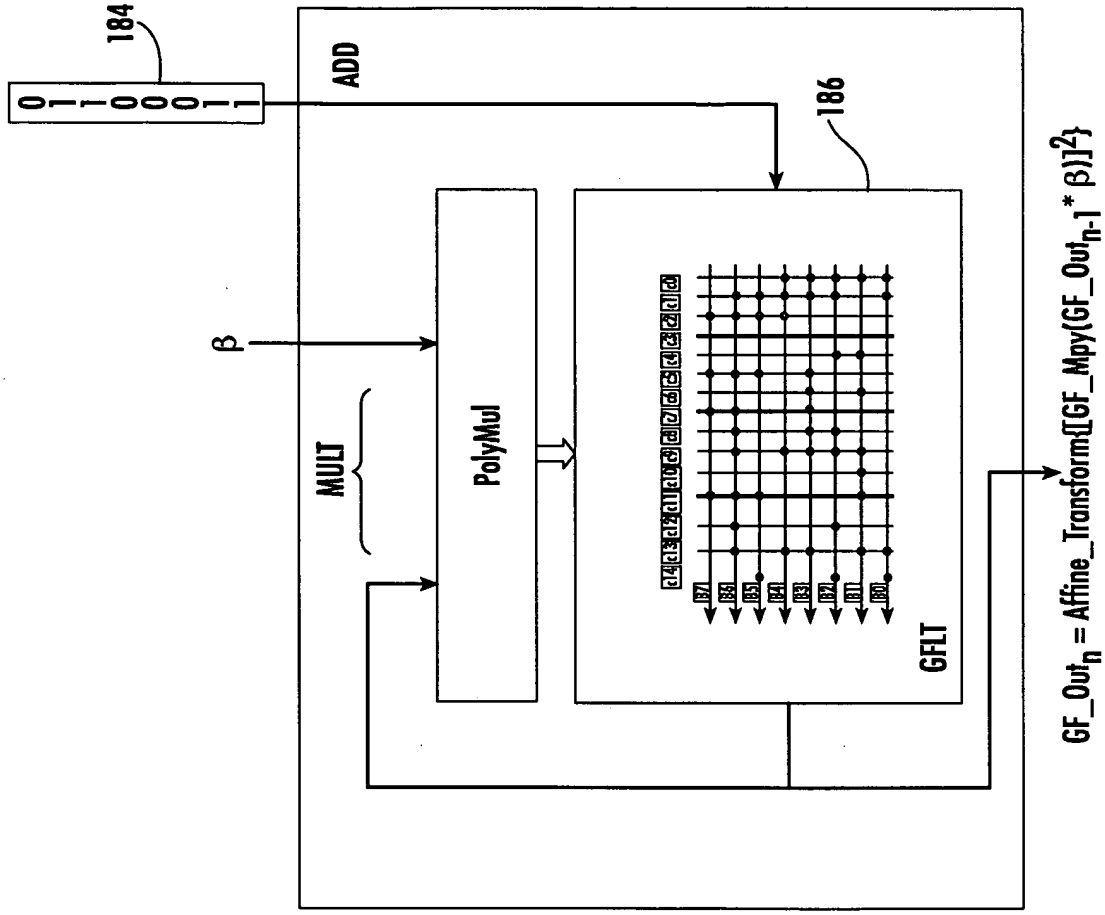

184
0 1 0 0 0 1
ADD
186
β
MULT
PolyMul
GFLT
$GF_Out_n = Affine_Transform\{[GF_Mpy(GF_Out_{n-1} * \beta)]^2\}$

FIG. 16

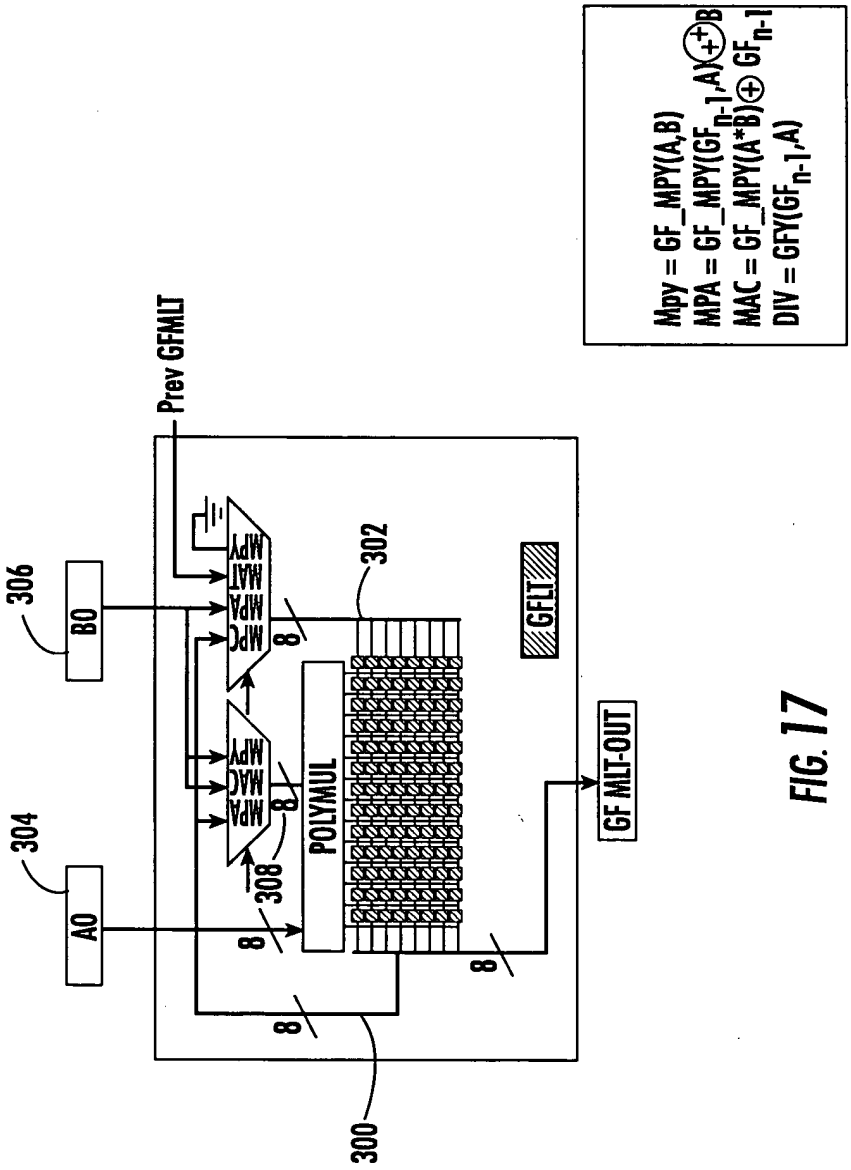

Mpy = GF_MPY(A,B)
MPA = GF_MPY(GF$_{n-1}$,A)⊕B
MAC = GF_MPY(A*B)⊕ GF$_{n-1}$
DIV = GFY(GF$_{n-1}$,A)
Prev GFMLT
306
B0
304
A0
MPY
MAT
MPA
MPC
MPY
MAC
MPA
8
308
POLYMUL
302
GFLIT
GF MLT-OUT
8
8
8
300

FIG. 17

15/15

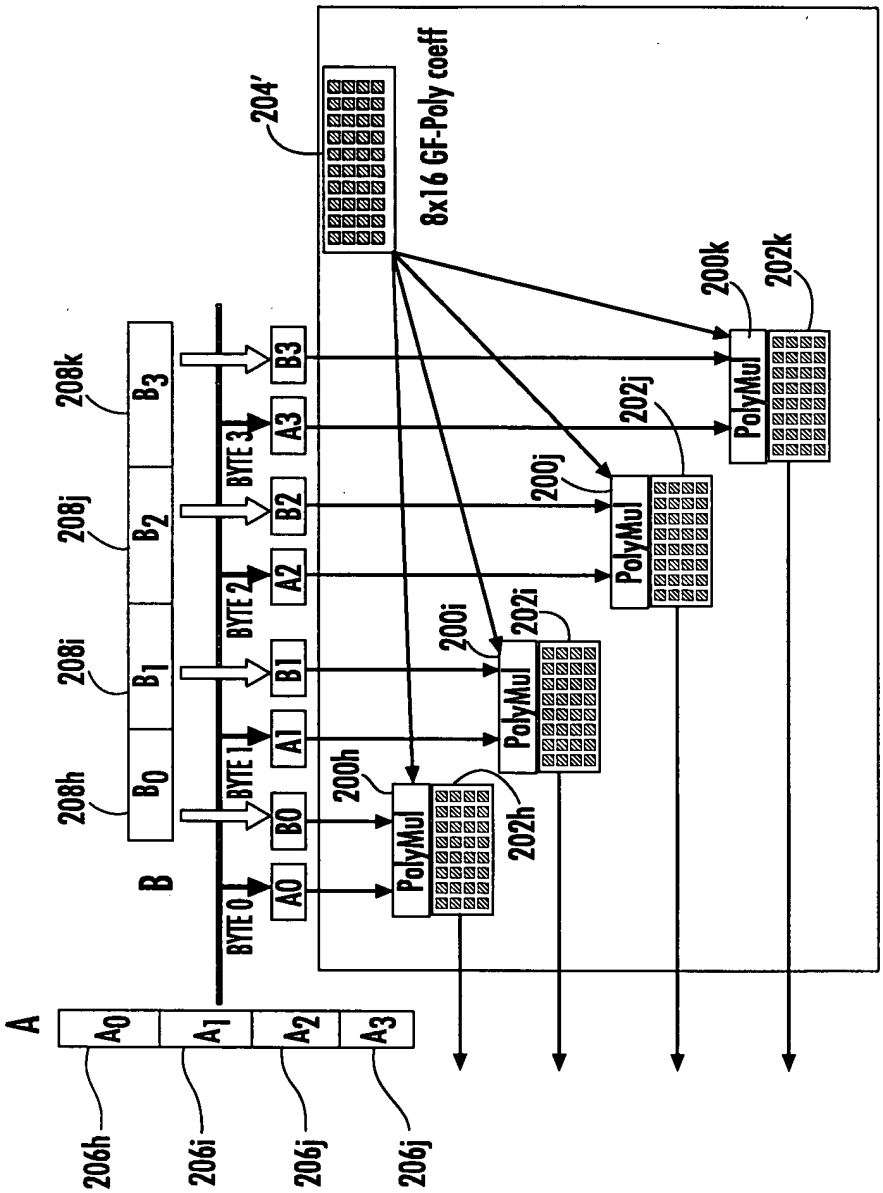

204'
8x16 GF-Poly coeff
200k
202k
PolyMul
202j
200j
PolyMul
200i
202i
PolyMul
200h
202h
PolyMul
208k
B3
208j
B2
208i
B1
208h
B0
B
BYTE 3
BYTE 2
BYTE 1
BYTE 0
B3
A3
B2
A2
B1
A1
B0
A0
A
A0
A1
A2
A3
206h
206i
206j
206j

FIG. 18